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Supplement of

Future forests: estimating biogenic emissions from net-zero aligned afforestation pathways in the UK

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Supplementary information

The following supplementary figures illustrate the percentage change in area of grass and tree PFTs following afforestation.

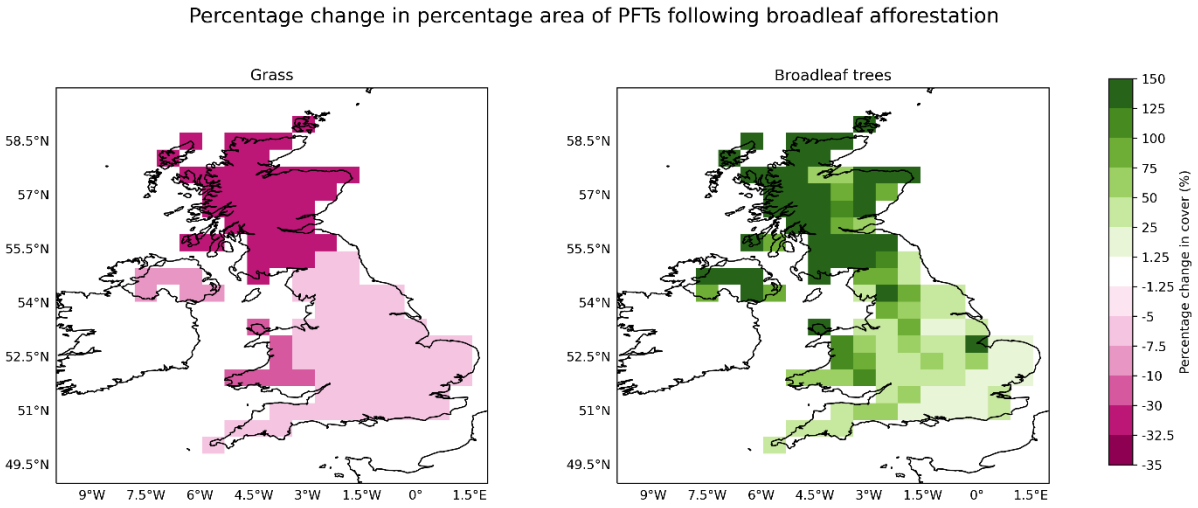

Figure S1. Percentage change in the cover of grass and broadleaf tree PFTs following broadleaf afforestation.

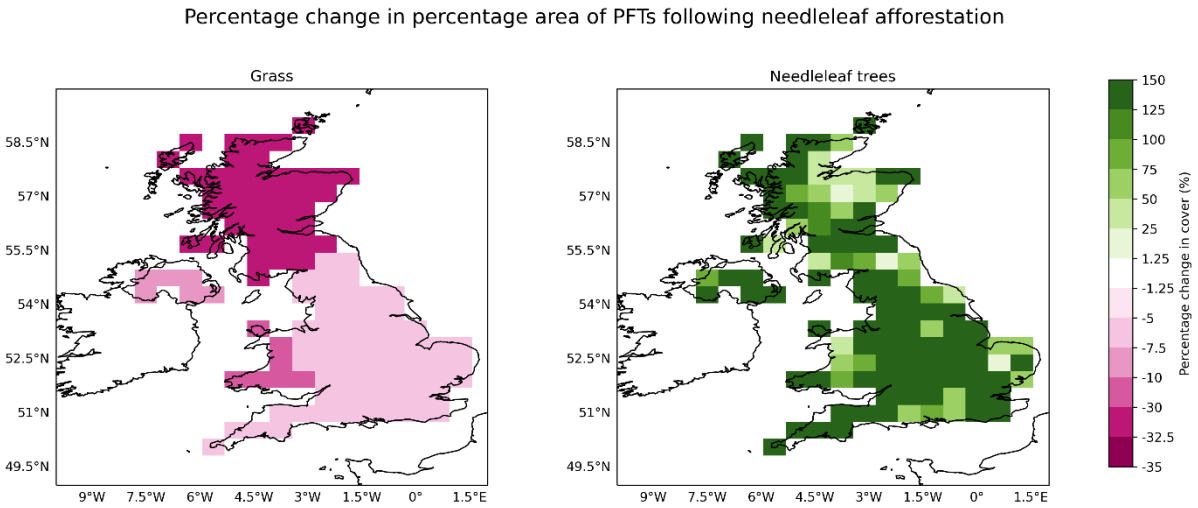

Figure S2. Percentage change in the cover of grass and needleleaf tree PFTs following needleleaf afforestation.

The following supplementary figures illustrate the percentage change in BVOC emissions by afforestation experiment relative to present day land cover.

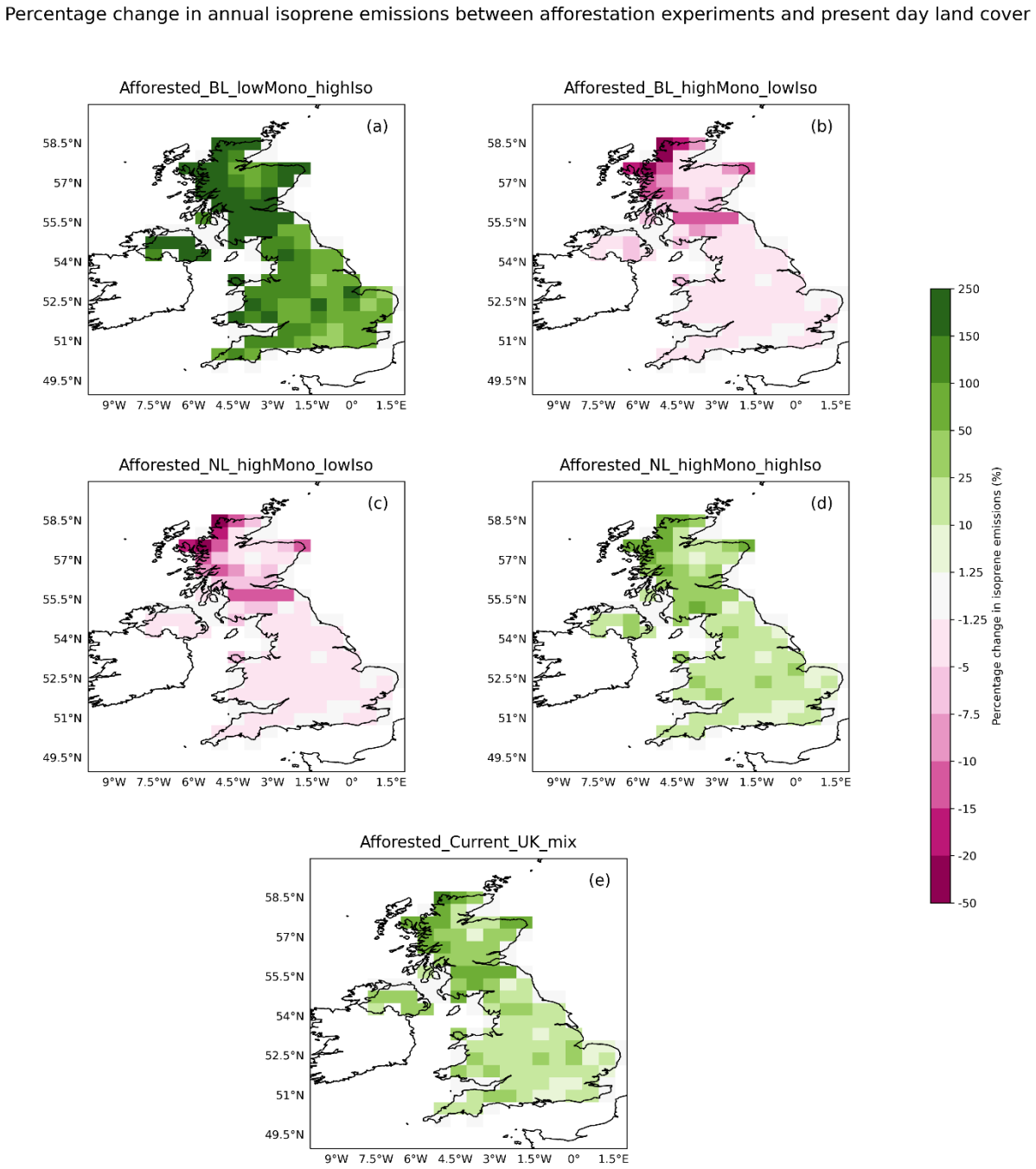

Figure S3. Distribution of the percentage change in modelled annual UK isoprene emissions following afforestation for five afforestation experiments; a) Afforested_BL_lowMono_highIso, b) Afforested_BL_highMono_lowIso, c) Afforested_NL_highMono_lowIso, d) Afforested_NL_highMono_highIso and e) Afforested_Current_UK_mix. Experiment configuration is detailed in Table 4.

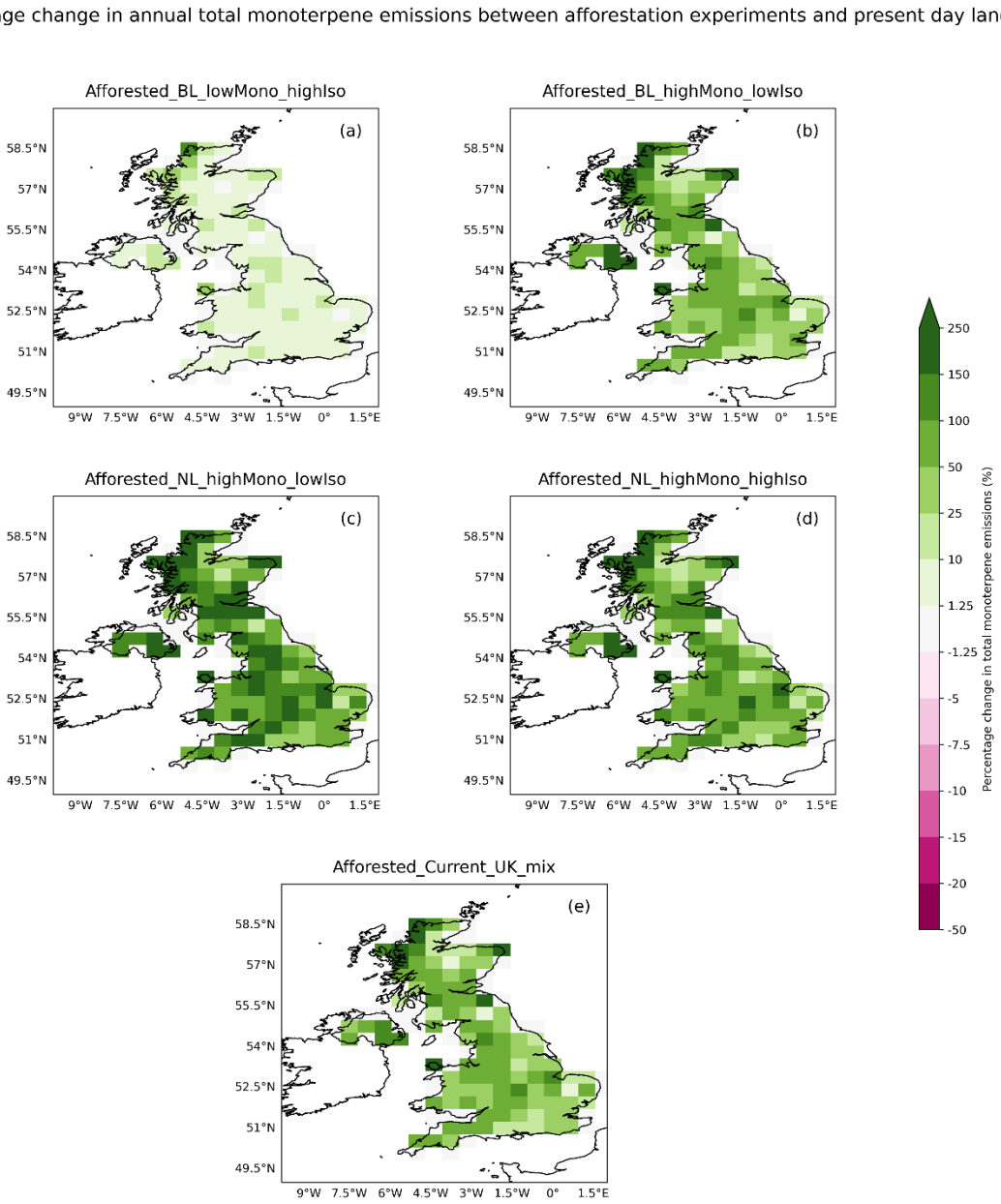

Figure S4. Distribution of the percentage change in modelled annual UK total monoterpene emissions following afforestation for five afforestation experiments; a) Afforested_BL_lowMono_highIso, b) Afforested_BL_highMono_lowIso, c) Afforested_NL_highMono_lowIso, d) Afforested_NL_highMono_highIso and e) Afforested_Current_UK_mix. Experiment configuration is detailed in Table 4.

Table S1. Matrix of tree species data reviewed to determine the appropriate UK tree species for inclusion in the emissions potential review and development of emissions potential scenarios.

Tree species	**Included in Forest Research tree species database (Forest Research, no date)**	**Makes up high proportion of current tree species (Forest Research, 2022)**	**Included in EU forests4F study (Mauri et al., 2022)**	**Has species specific EP available**	**Has data for both Isoprene and Monoterpenes**	**Include?**
Common alder	✓	×	✓	✓	✓	✓
Scots pine	✓	✓	✓	✓	✓	✓
Corsican pine	✓	✓	✓	✓	✓	✓
Lodgepole pine	✓	✓	×	✓	✓	✓
Sitka spruce	✓	✓	×	✓	✓	✓
Norway spruce	✓	✓	✓	✓	✓	✓
European larch	✓	×	✓	✓	✓	×
Hybrid larch	✓	×	×	✓	✓	×
Douglas fir	✓	✓	×	✓	✓	✓
Silver birch	✓	✓	✓	✓	✓	✓
Downy birch	✓	×	✓	✓	✓	✓
Sessile oak	✓	✓	✓	✓	✓	✓
Pedunculate oak	✓	✓	✓	✓	✓	✓

Beech	✓	✓	✓	✓	✓	✓
Ash	✓	✓	✓	✓	✓	✓
Sycamore	✓	✓	✓	✓	✓	✓
Sweet chestnut	✓	✓	✓	✓	✓	✓
Hornbeam	✓	×	✓	✓	×	×
Common hazel	×	✓	✓	✓	✓	×
Hawthorn	×	✓	×	✓	✓	×
Willow	×	✓	×	✓	✓	×
Western red cedar	✓	×	×	✓	✓	×
Western hemlock	✓	×	×	✓	✓	×
Grand fir	✓	×	×	✓	✓	×
Nobel fir	✓	×	×	×	×	×

Table S2. Total annual isoprene emissions (kt) and percentage changes associated with two different algorithms for the isoprene activity factor for soil moisture.

Afforestation experiment short name	**Total annual isoprene emission (kt yr^{-1})** (by isoprene activity factor algorithm for soil moisture)		**Change due to inclusion of Wang et al., (2022) algorithm (kt yr^{-1}; percentage values given in brackets)**
	Original (Guenther et al., 2012)	Drought stress (Wang et al., 2022)	
Baseline	38.71	37.65	-1.06 (-2.74%)
Afforested_Current_UK_mix	40.70	39.89	-0.81 (-2.00%)
Change due to afforestation and increase in CO_2 concentration (kt yr^{-1}; percentage values given in brackets)	1.99 (+5.14%)	2.24 (+5.95%)	